

# The Conundrum of Modern Art

## Prestige-Driven Coevolutionary Aesthetics Trumps Evolutionary Aesthetics among Art Experts

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**Abstract** Two major mechanisms of aesthetic evolution have been suggested. One focuses on naturally selected preferences (Evolutionary Aesthetics), while the other describes a process of evaluative coevolution whereby preferences coevolve with signals. Signaling theory suggests that expertise moderates these mechanisms. In this article we set out to verify this hypothesis in the domain of art and use it to elucidate Western modern art's deviation from naturally selected preferences. We argue that this deviation is consistent with a Coevolutionary Aesthetics mechanism driven by prestige-biased social learning among art experts. In order to test this hypothesis, we conducted two studies in which we assessed the effects on lay and expert appreciation of both the biological relevance of the given artwork's depicted content, viz., facial beauty, and the prestige specific to the artwork's associated context (MoMA). We found that laypeople appreciate artworks based on their depictions of facial beauty, mediated by aesthetic pleasure, which is consistent with previous studies. In contrast, experts appreciate the artworks based on the prestige of the associated context, mediated by admiration for the artist. Moreover, experts appreciate artworks depicting neutral faces to a greater degree than artworks depicting attractive faces. These findings thus corroborate our contention that expertise moderates the Evolutionary and Coevolutionary Aesthetics mechanisms in the art domain. Furthermore, our findings provide initial support for our proposal that prestige-driven coevolution with expert evaluations plays a decisive role in modern art's deviation from naturally selected preferences. After discussing the limitations of

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our research as well as the relation that our results bear on cultural evolution theory, we provide a number of suggestions for further research into the potential functions of expert appreciation that deviates from naturally selected preferences, on the one hand, and expertise as a moderator of these mechanisms in other cultural domains, on the other.

**Keywords** Evolutionary aesthetics · Coevolutionary aesthetics · Prestige bias · Expertise · Modern art · Art appreciation

Two major mechanisms of aesthetic evolution have been suggested in the broad evolutionary literature. The first mechanism posits that aesthetic preferences result from *direct selection* on sensory-cognitive systems and that aesthetic traits evolve to match these preferences (Kirkpatrick and Ryan 1991; Pinker 1997, 2002; Ryan 1998; Sperber and Hirschfeld 2004; Verpooten and Nelissen 2010, 2012). In contrast, the second mechanism assumes that selection exerted on aesthetic traits by aesthetic preferences creates *indirect selection* on aesthetic preferences themselves, which results from coevolution between aesthetic traits and preferences (Boyd and Richerson 1985; Fisher 1930; Kirkpatrick 1982; Lande 1981; Prum 2010, 2012, 2013). These mechanisms are often characterized as being either complementary or mutually exclusive explanations for the evolution of aesthetics. However, signaling theory, a body of empirical and theoretical work that examines communication between (mostly non-human) animals from an evolutionary perspective (Johnstone 2002), suggests a third option. Expertise might moderate these mechanisms: the aesthetic preferences of inexperienced individuals (hereafter referred to as “laypeople”) result from direct natural selection over our species’ phylogeny, whereas the aesthetic preferences of experienced individuals (hereafter referred to as “art experts”) are indirectly selected through an ongoing process of coevolution with aesthetic entities.<sup>1</sup> Signaling theory indicates that moderation of these mechanisms by means of expertise is a general phenomenon (Johnstone 2002). It may occur in any kind of communication system, from animal mating systems to human cultural domains such as art. In this article we suggest that conceiving expertise as a moderator might provide an explanation for why Western modern art, contrary to traditional, ethnic and popular art, does not appeal to the senses and has even exhibited disdain at times toward so-called “easy beauty” (Pinker 2002; Steiner 2001). Modern art’s deviation from aesthetic appeal is epitomized by Duchamp’s *Fountain* (1917), an ordinary urinal placed in artistic context, which became one of the most influential artworks of the past hundred years (Danto 2003). As we shall see, various explanations have been advanced in an effort to understand modern art’s deviation; however, these explanations are arguably only partial at best. Moreover, this deviation is generally considered to fall outside the scope of evolutionary analysis, which may explain why hardly any (evolutionary inspired) behavioral research has been conducted to assess it. Here we contest this common view and propose to test an evolutionary account that reconciles both the evolutionary and coevolutionary aesthetic mechanisms, thereby shedding light on modern art’s deviation from aesthetic appeal.

<sup>1</sup> Note that this latter process of evaluative coevolution can proceed by genetic and/or cultural mechanisms. Where the art expert is concerned, this process depends on cultural mechanisms.

We proceed as follows: first, we introduce the two generic mechanisms of aesthetic evolution and review how they have been applied to explain the evolution of art; in other words, how art undergoes change over time. Next, we discuss how these mechanisms are moderated by expertise before making predictions about lay and expert art appreciation. We suggest that the Evolutionary Aesthetics mechanism explains the evolution and cross-cultural appeal, on behalf of general audiences, of traditional, popular, and ethnic art, whereas the Coevolutionary Aesthetics mechanism is specifically associated with expertise and explains modern art's deviation. We then attempt to verify these predictions across two studies. After discussing the limitations of our research as well as the relation that our results bear on cultural evolution theory, we then provide a number of suggestions for further research into the potential functions of expert appreciation that deviates from naturally selected preferences, on the one hand, and expertise as a moderator of these mechanisms in other cultural domains, on the other.

## Evolutionary Aesthetics

All sensory-cognitive systems have biases; animal and human minds are not blank slates (Arak and Enquist 1995; Kirkpatrick and Ryan 1991; Pinker 2002). These biases or preferences are usually maintained by natural selection in one context—for example, for finding food or avoiding becoming food—but may be exploited in other contexts. As a cause of the evolution of (predominantly) male sexual display traits, this process is known as sensory exploitation (or sensory trap, and receiver psychology; Ryan 1998). As a cause of the evolution and stability of cultural representations such as art, this process is known as content bias or cognitive attraction (Henrich and McElreath 2003; Morin 2013; Sperber and Hirschfeld 2004). In this article, however, we use the term *Evolutionary Aesthetics* (hereafter abbreviated as EA), in contrast with *Coevolutionary Aesthetics* (hereafter abbreviated as CA) (Prum 2012, 2013; cf. Volland and Grammer 2003), to refer to this process.

The evolution of iconic representations that recognizably mimic an original model probably provides the most clear-cut illustration of this generic process (Verpooten and Nelissen 2010). For example, female mouth-brooding cichlid fish evolved a preference for egglike stimuli because, once they have spawned, they have to suck the eggs up into their mouths, and each missed egg may result in a reduction in fitness. In response, the male members of several species of cichlid have evolved egg mimics on their anal fins that trigger a sucking response in the female. This enables the male to deposit his sperm on the eggs located in the female's mouth, thereby fertilizing them. It has been demonstrated experimentally that females prefer males with anal egg spots to those that do not exhibit this trait (Egger et al. 2011).

Similarly, it has been suggested that cross-cultural and transhistorical convergence onto certain cultural representations is attributable to universally human aesthetic preferences that have evolved under natural selection (Sperber and Hirschfeld 2004). Compelling evidence for this hypothesis was (inadvertently) provided by artists Komar and Melamid, when, in a series of polls, they found considerable uniformity within and across cultures worldwide with respect to taste in art (Dutton 1998; Komar et al. 1997). Their polls show that the average person's preference in art tends to gravitate toward specific types of iconic representations: particular landscapes, animals, and humans.

These universal art preferences nicely match predictions about universal human preferences that affected the fitness of our Pleistocene ancestors (Dissanayake 1998) and are believed to have been selected in order to guide habitat choice, hunting, and predator avoidance as well as peer and mate choice (Barrett 2005; Falk and Balling 2010; Little et al. 2011; New et al. 2007; Orians and Heerwagen 1992; Windhager et al. 2011; Yang et al. 2012). The universality and antiquity of these art preferences is further supported by prehistoric rock art and sculpture (dated to about 35,000 BP), in which animal and human figures are featured predominately in antipodal regions of the world (Hodgson and Watson 2015; Verpooten and Nelissen 2010). Focusing on the motivational system underlying art appreciation and production within this framework, Pinker (1997) suggested that art has evolved because it pushes, so to speak, our naturally selected “pleasure buttons.”

The recent development in Western art history known as modern art does not, however, fit the picture painted by this Evolutionary Aesthetics account. Indeed, universal, naturally selected preferences no longer occupy a central position in modern art. Various verbal explanations for modern art’s deviation from naturally selected aesthetic preferences have been adduced. Opponents of modern art and its deviation from aesthetic appeal have asserted that a preference for modern art had become a badge of elite membership and status (Bourdieu 1979), or that its deviation resulted from the fact that art had been subordinated to art theory (Wolfe 1975), or that it resulted from artists’ attempts to maintain their continued relevance in the age of mechanical reproduction (Miller 2000), or, more recently, that it is an adverse consequence of the growing influence of dealers and inflated market prices (Thompson 2009). Connoisseurs of modern art have contended that it is the product of a highly specialized cultural domain, the “artworld,” and is therefore more difficult to grasp than traditional and popular art. As such, modern art requires expertise or “artistic understanding,” which includes a sensitivity to relevant art-historical contexts (Bullot and Reber 2013; Danto 1964, 2003). In fact, Danto (1964) proposed the concept of the artworld, defined as the social and cultural context in which “theories of art” evolve, specifically in order to address the issue of modern art’s deviation from universal aesthetic appeal. His solution holds that, since modernity, an observer’s theory of art (a cognitive structure or capacity that critically affects the outcome of the evaluation of art) changes over time, thereby affecting the kind of art that modern artists produce.

Adherents of an EA approach to art tend to dismiss modern art as well, viewing it as a non-evolutionary phenomenon or even as a repudiation of human nature (Dissanayake 1995; Miller 2000; Pinker 2002). In contrast, connoisseurs of modern art tend to be opposed to an Evolutionary Aesthetics approach to art because they claim that Evolutionary Aesthetics is only consistent with popular, folk, and traditional art, which they do not consider to be art insofar as the appreciation of these art forms—that is, of non-modern art—does not involve a theory of art, which they consider to be a necessary condition for art (Davies 2012). Thus, one thing that both opponents and proponents of an EA approach to art seem to agree on is that modern art falls outside the scope of evolutionary analysis (Bullot and Reber 2013; Dissanayake 1995; Miller 2000; Pinker 2002). We question this commonly held view and assert that modern art’s deviation from naturally selected aesthetic preferences is consistent with a much less well-known CA mechanism. Moreover, this mechanism can accommodate the multiple, tendentious verbal accounts that seek to either support or dismiss modern art’s deviation.

## Coevolutionary Aesthetics

In contrast with the EA mechanism, the CA mechanism predicts that selection by aesthetic preferences on aesthetic traits creates indirect selection on aesthetic preferences themselves, which results from coevolution between aesthetic preferences and traits (Prum 2012, 2013). The role of female choice in the evolution of the peacock's tail constitutes a textbook example of this process in the domain of intersexual selection (in contrast to intrasexual competition between members of the same sex within a species). The idea is that the genes for a peahen's preference for larger tails and the genes for larger tails become evolutionarily correlated (i.e., offspring inherit both the genes for the preference ["choosy" daughters] and the larger tails ["sexy" sons]), and that, as a result, the peahen's preference exerts indirect selection on itself (Fisher 1930; Kirkpatrick 1982; Lande 1981). Thus, the coevolution of preference and a corresponding trait is essential to this process (Prum 2010, 2012). In addition, this same population might get caught up in a runaway process in which the correlated values of preference and the corresponding trait advance with ever-increasing speed (Fisher 1930). In instances where the trait reliably indicates viability (survival benefit) in addition to sexiness (reproductive benefit), the process is called "good genes" selection. These latter two intersexual selection processes are not, however, necessary features of the CA mechanism (Prum 2010, 2012).

Although this mechanism is fairly popular as a sexual selection model (Prum 2010, 2012), it has only rarely been considered with respect to the cultural evolution of human aesthetics and art. We are only aware of two accounts, both of relevance here. We first mention work by Prum (2013), who recently elaborated on the similarities between this sexual selection mechanism and the way works of art and their evaluations coevolve in an "artworld," in keeping with Danto's titular concept. The second account of interest was advanced in the field of cultural evolution theory by pioneers Boyd and Richerson (1985), who explicitly linked CA to a mechanism they called prestige-biased social learning. Boyd and Richerson (1985) used the indirect selection model of female preference to explain the evolution of prestige systems. They accomplished this by modifying the model; that is, by replacing female mating strategies (genetic transmission) in the equations with both sex's social learning strategies (social transmission). As a result, they suggested that prestige is the culturally evolved analogue of the peacock's tail and that prestige bias—in other words, preferentially learning from prestigious individuals—is the analogue of female preference for large tails. The authors note that a similar feedback process is therefore at work in the prestige system. Their reasoning can be glossed as follows: First, the greater the number of individuals who copy the cultural repertoire of the prestigious individual, the more prestigious it becomes given that prestige depends on the number of copiers. Second, social learners who employ prestige bias become prestigious themselves because they copy whichever cultural traits have made the prestigious individual influential. Even though Boyd and Richerson (1985) explicitly linked this prestige-bias-driven coevolutionary cultural process to aesthetics and art, they did not elaborate much on it.

Prestige bias would seem to better enable us to accommodate some of the verbal accounts of modern art's deviation for the following reasons: first, prestige bias might also subsume the badge-of-elite-membership account because prestige is a mechanism for acquiring status (Bourdieu 1979; Henrich and Gil-White 2001); second, prestige

bias has been invoked to explain the emergence of financial market bubbles (Bell 2013), and it has indeed been suggested that the art market is particularly inflated (Thompson 2009); and third, its coevolutionary nature offers an explanation for how influential theories of art can begin to play a role, with respect to both art appreciation and artistic creation, as one of the factors driving modern art's divergence from naturally selected preferences (Bullot and Reber 2013; Danto 1964, 2003; Wolfe 1975). Hence, prestige bias seems to have a lot of unifying and simplifying potential regarding the conundrum of modern art. Moreover, it falls well within the scope of evolutionary biology and has even been observed among nonhuman animals (Boyd and Richerson 1985; Horner et al. 2010).

Crucially, the EA and CA mechanisms would appear to be incompatible in the sense that preferences are thought to be either fixed, matching, naturally selected aesthetic preferences, as assumed by the EA account, or dynamically coevolving with signals such as artworks, as assumed by the CA account. In fact this apparent generic incompatibility has already sparked similar but independent debates among sexual selection theorists and cultural evolutionists (e.g., Claidière and Sperber 2007; Henrich and Boyd 2002; Ryan 1998). This might also explain why students of the evolution of art embrace either EA or—albeit seldom—CA as an explanatory framework. On the one hand, adherents of EA tend to dismiss modern art as falling outside the scope of evolutionary analysis because it does not fit their mechanism. On the other hand, both Prum (2013) and Boyd and Richerson (1985) have argued that the CA mechanism applies very broadly and offer it as a complete explanation of aesthetics, neglecting the constraints that the naturally selected preferences of perceivers may exert on aesthetic coevolution. Here we propose to address these shortcomings by reconciling both mechanisms using expertise as a moderator.

## Expertise as Moderator

To the best of our knowledge, expertise of receivers as a determinant of evolutionary outcomes has not received due consideration in evolutionary studies of art. The broader evolutionary literature nevertheless clearly hints at expertise as a moderator of the EA and CA mechanisms. Empirical and theoretical work in (nonhuman) animal communication indicates that expertise may moderate the EA and CA mechanisms. As animals gain expertise in a domain (for instance, a mating system), they learn or evolve to resist exploitation of their preexisting aesthetic preferences (de Jager and Ellis 2014; Johnstone 2002). Moreover, this resistance may be associated with CA kicking in (e.g., indirect selection on mating preferences: Garcia and Ramirez 2005). Thus, expertise may cause CA to override receiver preferences that are based on EA (Johnstone 2002). This does not require the assumption that exploitation proves costly to receivers (it can be neutral as well: Endler and Basolo 1998), it merely requires that having coevolved aesthetic preferences is more beneficial for experienced individuals.

The same reasoning should apply to the EA and CA mechanisms at work in the art domain. This would mean that the capacity for art appreciation of laypeople or the general audience should correspond to the EA mechanism. Conversely, art expert appreciation should correspond to the CA mechanism. The existing literature suggests that this is indeed the case. It is well-established, for example, that Komar et al.'s (1997)

results were obtained cross-culturally relative to *general* audiences and that these results are consistent with the Evolution Aesthetics mechanism (Dissanayake 1998; Pinker 2002). Also of note, Prum (2013) based the CA mechanism on the similarities between Danto's concept of the artworld and the indirect selection mechanism of sexual selection. One commonality Prum (2013) seems to have neglected, however, is that both the artworld and indirect selection only occur among experienced individuals. As Danto (1964) pointed out, the artworld is a specialized cultural domain consisting of communities of art experts of all kinds (artists, critics, curators, performers, dealers, collectors, etc.). Consequently, and in keeping with Danto's (1964) formulation, we explicitly link the appreciation and evolution of modern art to an expert audience—in other words, to the members of the artworld. Modern art's deviation can be understood in terms of expert appreciation. Following Boyd and Richerson (1985), we suggest that this CA process (among experts) is driven by prestige bias.

In summary, we make the following predictions: expertise moderates the EA and CA mechanisms in relation to art, such that laypeople appreciate art based on the correspondence of its content with naturally selected aesthetic preferences, whereas experts appreciate art based on the prestige of its context, which may be associated with a deviation from naturally selected aesthetic preferences.

## Present Research

In order to test our evolutionary account's predictions about art preferences, we considered the following three factors at work in art appreciation: the biological relevance of the content of artworks, the context of prestige surrounding the artworks, and the artistic expertise of evaluators. Expertise was measured using a questionnaire and an art quiz, whereas the other two factors were manipulated.

To assess the effect of biological relevance of the content of artworks, we varied the facial attractiveness depicted in artworks. We used facial attractiveness because it represents a rather unambiguously biologically relevant trait. Humans seem to have an evolved preference for certain facial features we tend to call "beautiful" because they reflect fitness and therefore may enhance mate and peer choice (Little et al. 2011). In accordance with the idea that the capacity to experience beauty is an evolved motivational system (Thornhill 2003), a large body of empirical research suggests that perceiving facial attractiveness may elicit aesthetic pleasure given that it is associated with the activation of reward- and emotion-related brain areas such as the orbitofrontal cortex, basal ganglia, and amygdala (Kampe et al. 2001; Nakamura et al. 1998; Winston et al. 2007). Thus, in keeping with our contention that the EA mechanism as expressed in art applies to laypeople, we predicted an indirect effect of the given artwork's content on lay appreciation via aesthetic pleasure. It is important to note that we used photographs of faces presented as artworks because they have the advantage of being credible examples of both modern art (the prestigious MoMA collection contains several of them) and popular art (photo portraits abound in mass visual culture). In so doing, we avoid the effect of any prejudices laypeople or experts might have toward modern or popular art, respectively, which would not be possible if we used examples of art that clearly fall into either of these categories (e.g., abstract art).

To assess prestige bias, we varied the prestige of the museum collection to which an artwork belongs. We assumed that the reputation of the museum in which the artwork is exposed signals the prestige of individuals associated with the artwork, given that levels of prestige associated with artworks, artists, and art institutions are inextricably intertwined (de Nooy 2002). Moreover, we assessed the participants' admiration for the hypothetical artist who created the artwork in order to further document the role of prestige bias in art appreciation (Henrich and Gil-White 2001). In other words, if we were to find an indirect effect of prestige on expert appreciation via admiration, it would strengthen our contention that experts employ prestige bias in the context of art. Furthermore, and in keeping with the behavior of the CA mechanism, we expected this indirect effect of prestige to be associated with a deviation from the naturally selected preference for depictions of facial attractiveness peculiar to laypeople.

Study 1 was an exploratory lab study that tested the effects of content and prestige on art appreciation among a sample of participants who varied somewhat in expertise (students of economics and business). In Study 1b we also assessed the hypothesized mediating variables (aesthetic pleasure and admiration for the artist). Because we did not find any significant moderating effect of expertise on content or prestige among these participants, we provisionally concluded that the potential moderating effect of expertise could not be tested because their levels of expertise were too low. Therefore, we conducted a second study that replicated the methods of Study 1b; however, this time we recruited "real" art experts (art professionals of all sorts), in addition to laypeople, who completed the study online. In this second study we did find the predicted moderation by expertise.

In both studies we used a stimulus set consisting of color portraits that were produced for the purposes of face research, rather than using real artworks. We did this in order to avoid the effects of familiarity (Schacht et al. 2008). Conveniently, these portraits were taken under identical studio conditions, and they were standardized with respect to frontal view and frontal gaze direction, resolution (300 dpi), and lighting. Accessories (e.g., jewelry or hair clips) were avoided, makeup was restricted to eyeliner, and no clothes were in view. Faces exhibited a neutral expression in order to avoid the effects of affect. The original portraits were reframed to ensure identical display windows and were placed in front of a standardized light gray background (Schacht et al. 2008). The fact that there was therefore no variation between the stimuli with respect to potentially artistically relevant features, such as composition, choice of background, technique, or skillfulness (they were all taken by the same photographer), was crucial to our purposes. In addition, the faces had already been rated according to attractiveness. Simply put, we only used female faces that had received intermediate (control) vs. high ratings of attractiveness. We started off with six portraits in each condition in Study 1; however, because appreciation turned out to be highly consistent within conditions (Cronbach's alphas for the conditions were coincidentally both 0.92), we reduced the number of stimuli to two in each condition in Studies 1b and 2 (see Fig. 1 and the ESM for high-resolution versions). In all three studies, the facial attractiveness (neutral vs. attractive) of the portraits was manipulated *within* subjects.

In all three studies, we manipulated prestige (neutral vs. the influential Museum of Modern Art or "MoMA") *between* subjects to conceal the fact that we were assessing its effect because we expected that experts might not consciously realize or wish to admit that they blatantly appreciate the same artwork more if it belongs to a prestigious



museum. Hence, participants were randomly assigned to either one of these conditions; those in the neutral condition were merely informed in the introductory screen that they were going to judge artwork, whereas those in the prestige condition were informed in the introductory screen that the artwork they were going to judge belonged to the MoMA's permanent collection. Anticipating the possibility that participants might not have any prior knowledge of the MoMA, the introduction provided some background information about the museum: that it is located in New York and that it is one of the most prestigious museums for modern and contemporary art in the world. To conceal the fact that the stimuli were not real works of art, let alone that they did not belong to the MoMA collection, we used an equal number of "fillers"—artistic portraits that were not used in the analysis but that are part of the MoMA's permanent collection and that looked somewhat similar to the stimuli (see ESM §2). The fillers also served to make the content manipulation (variation in facial attractiveness of portraits) less apparent.

## Study 1

### Participants

In Study 1a, 152 undergraduate students from a large European university participated in exchange for course credits or a participation fee. One participant who did not finish the survey was excluded from the analysis. The resulting 151 participants ranged in age from 17 to 26 ( $M = 19.24$ ,  $SD = 1.66$ ); 74 were male and 77 female. In Study 1b, 120 students participated in exchange for course credit or a participation fee. They ranged in age from 18 to 26 ( $M = 19.56$ ,  $SD = 1.709$ ); 82 of them were male, 38 were female.



**Fig. 1** Stimuli depicting faces previously rated as being attractive (*left*) and neutral (*right*) (Schacht et al. 2008)

## Procedure and Measures

Participants came to the laboratory in groups of up to 10 individuals and were assigned a seat in a partially enclosed cubicle where they completed the study in private on a personal computer. The survey was created using Qualtrics and consisted of several blocks in fixed order: an introduction, the pictures, an expertise questionnaire, and finally some questions regarding demographics. The participants began the survey by clicking on an icon. In the introductory screen, participants were informed about the procedures of the study and the fact that their participation was anonymous and voluntary. They agreed to participate by pressing on the “proceed” arrow.

Following the introductory screen, the first picture appeared. In the MoMA condition, the picture featured “© MoMA” right below the right corner of the picture; in contrast, in the neutral condition, the picture was not accompanied by a copyright symbol. Various implicit questions were included beneath each picture. In Study 1a, the phrase read “I appreciate this artwork . . .” followed by a seven-point Likert scale ranging from “not at all” (=1) to “very much” (=7). In Study 1b, two additional phrases, “I find what is depicted aesthetically pleasing . . .” and “I admire the artist who made this work . . .,” were both followed by the same Likert scale. Only after the participant had responded to all of the questions could they move on to the next picture/question pair. The order of the pictures was randomized and included both the stimuli and fillers.

As the next step in both Studies 1a and 1b, (subjective) art expertise was probed using a slightly modified questionnaire from Leder et al. 2012. This questionnaire is composed of six questions, including “How often do you go to the museum?” and “How important is art in your life?” on seven-point (Likert) scales. Finally, it was important that the participants (falsely) believed that the face research pictures we used were real artworks. Moreover, the participants in the prestige condition had to believe that the artworks belonged to the MoMA’s permanent collection. To verify this, we showed the participants 6 pictures, 5 of which were real works of art from the MoMA that we also used as fillers and 1 of which was one of the face research stimuli. Participants had to indicate which one of these pictures they thought was not part of the MoMA’s collection.

## Results

**Stimulus Check** Simple proportion tests revealed that participants in the MoMA condition indicated significantly less often than expected by chance that the face stimuli did not belong to the MoMA (Study 1a:  $p = 5.3\% < p_{\text{chance}} = 1/6$  or  $17\%$ ;  $z = -2.55$ ,  $p < 0.01$  and Study 1b:  $p = 4.3\% < p_{\text{chance}} = 1/6$  or  $17\%$ ;  $z = -2.78$ ,  $p < 0.01$ ), demonstrating that we successfully concealed the fact that our stimuli (the face research pictures used in lieu of official artworks in order to avoid familiarity effects) did not really belong to the MoMA.

**Main Effects and Moderations** Generalized Linear Mixed Models (GLMMs) with content (neutral vs. attractive) as a within-subjects factor and prestige (neutral vs. prestigious) and subjective expertise (continuous) as between-subjects factors showed an overall effect of content in both studies (Study 1a:  $F_{1,147} = 21.18$ ,  $p < 0.01$ ; Study 1b:  $F_{1,116} = 19.13$ ,  $p < 0.01$ ), and of subjective expertise (Study 1a:  $F_{1,147} = 8.17$ ,  $p < 0.01$ ; Study 1b:  $F_{1,116} = 24.55$ ,  $p < 0.01$ ), but not of prestige (Study 1a:  $F_{1,147} = 0.25$ ,  $p = 0.62$ ;

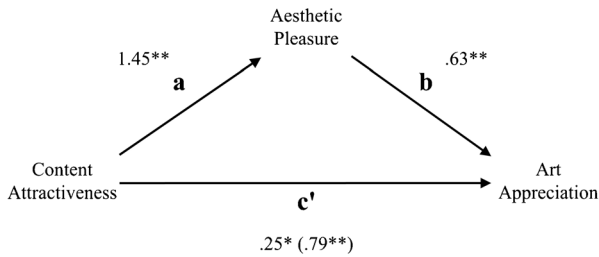
Study 1b:  $F_{1,116} = 0.69, p = 0.41$ ). Regarding the overall content effect, participants appreciated the pictures more if the content (the face) was attractive (Study 1a:  $M = 3.38, SD = 1.14$ ; Study 1b:  $M = 3.62, SD = 1.11$ ) compared with neutral (Study 1a:  $M = 2.79, SD = 1.04$ ; Study 1b:  $M = 2.83, SD = 1.17$ ). Regarding the overall subjective expertise effect, the positive regression coefficient ( $\beta = 0.04, t_{150} = 3.40, p < 0.01$ ) showed that appreciation and subjective expertise were positively associated.

The GLMMs further revealed that subjective expertise did not moderate prestige (Study 1a:  $F_{1,147} = 1.51, p = 0.22$ ; Study 1b:  $F_{1,116} = 1.02, p = 0.32$ ) nor did it moderate content (Study 1a:  $F_{1,147} = 0.24, p = 0.63$ ; Study 1b:  $F_{1,116} = 0.98, p = 0.33$ ). These results suggest that the EA mechanism drives art appreciation, irrespective of expertise. This conclusion could, however, be premature as subjective art expertise appeared surprisingly low in both of these samples (Study 1a:  $M = 16.92, SD = 7.18$  and Study 1b:  $M = 17.70, SD = 6.89$ , on a scale ranging from 6 to 42). Therefore, in order to falsify this possibility, we attempted to include participants with more expertise in the second study.

**Mediation** If the EA mechanism indeed applies to the majority of these participants, we would expect that the main effect of content that we found was mediated by aesthetic pleasure. Therefore, multiple regression analyses were conducted on the sample provided by study 1b in order to assess each component of the proposed mediation model (Baron and Kenny 1986). Firstly, we found that, consistent with the above analyses, attractive content (as opposed to neutral content) was positively associated with art appreciation ( $\beta = 0.79, t_{119} = 8.47, p < 0.01$ ). We also found that attractive content was positively related to aesthetic pleasure ( $\beta = 1.45, t_{119} = 14.58, p < 0.01$ ). Lastly, the results indicated that the mediator, aesthetic pleasure, was positively associated with art appreciation ( $\beta = 0.63, t_{119} = 18.61, p < 0.01$ ). Because both the **a** and **b** paths were significant (Fig. 2), mediation analyses were tested using the Sobel test (Baron and Kenny 1986; MacKinnon et al. 1995; Sobel 1982).<sup>2</sup> The results of the Sobel test ( $t = 11.48, p < 0.01$ ) supported the prediction that aesthetic pleasure mediated the effect of content on art appreciation. In addition, the results indicated that the direct effect of content on art appreciation remained significant but diminished ( $\beta = 0.25, t_{119} = 2.50, p = 0.01$ ) when controlling for aesthetic pleasure, thereby adding further support to mediation. Furthermore, to address the concern that participants did not clearly distinguish between aesthetic pleasure and appreciation, we refuted the existence of a reverse causal effect between aesthetic pleasure as a mediator and variable appreciation as the outcome by demonstrating that the **c'** path of the reversed model differed from the original; in other words, the direct effect of content on aesthetic pleasure did not decrease when controlling for art appreciation ( $\beta = 0.90, t_{119} = 10.68, p < 0.01$ ).<sup>3</sup>

<sup>2</sup> Even though bootstrapping is becoming the most popular method for testing mediation (Hayes 2009), we have chosen to use the Sobel test when testing mediation of within-subjects effects given that, to the best of our knowledge, no published bootstrapping method of such effects exists (Andrew F. Hayes, personal communication; Zhao et al. 2010). Moreover, our samples are large enough that they are not vulnerable to the typical problems associated with the Sobel test.

<sup>3</sup> In both studies, subjective expertise was higher among female participants (Study 1a:  $M = 20.39, SD = 6.42$ ; Study 1b:  $M = 19.87, SD = 7.78$ ) than it was among male participants (Study 1a:  $M = 14.76, SD = 6.09$ ; Study 1b:  $M = 15.55, SD = 6.48$ ). Study 1a:  $F_{1,150} = 30.56, p < 0.01$ ; Study 1b:  $F_{1,119} = 10.13, p < 0.01$ .



**Fig. 2** Indirect effect, via aesthetic pleasure, of content attractiveness on art appreciation in Study 1b. \*  $p < 0.05$ , \*\*  $p < 0.01$

## Study 2

### Methods

In Study 2 we aimed to include “real” art experts. We recruited 106 participants by posting the survey on the Facebook page of a Western European modern and contemporary art museum and on the Facebook page of a Western European art academy. In exchange for online participation, participants received an entrance ticket to an art exhibit. They ranged in age from 17 to 63 ( $M = 36.76$ ,  $SD = 12.25$ ); 50 were male and 56 female. Eighty-seven lay participants were recruited via sports and news Facebook pages. They ranged in age from 18 to 47 ( $M = 21.44$ ,  $SD = 3.70$ ); 42 were male and 45 female. In exchange for online participation, movie tickets were raffled off among them (20% chance). In this manner, we obtained two judgmental samples consisting of 193 participants in total. In the introductory screen, participants were informed about the procedures of the study and the fact that their participation was anonymous and voluntary. They agreed to participate by pressing on the “proceed” arrow.

In this study, we repeated the methods of Study 1b described above and added an objective expertise measurement in the form of a multiple choice art quiz aimed at assessing participants’ knowledge about classic, modern, and contemporary art (see [Appendix](#)).

### Results

**Stimulus Check** A simple proportion test revealed that participants in the MoMA condition indicated significantly less often ( $p = 3.3\%$ ) than expected by chance ( $p = 1/6 = 17\%$ ) that the face stimulus did not belong to the MoMA ( $z = -3.44$ ,  $p < 0.01$ ), demonstrating that we had successfully concealed the fact that our stimuli did not belong to the MoMA.<sup>4</sup>

**Expertise** One-way ANOVAs confirmed that the two judgmental samples differed substantially in subjective expertise,  $F_{1,191} = 362.04$ ,  $p < 0.01$ , and in objective expertise,  $F_{1,191} = 178.32$ ,  $p < 0.01$ . Both measures were also strongly correlated (Pearson’s  $r = 0.71$ ,  $p < 0.01$ ), indicating that the subjective expertise measure adapted

<sup>4</sup> In addition, as this question was asked of all participants, it allowed us to verify whether experts were better than laypeople at identifying that our stimuli did not belong to the MoMA. A  $z$  test to compare two proportions revealed that experts ( $p = 3.8\%$ ) and laypeople ( $p = 8\%$ ) performed equally poorly in distinguishing between real MoMA artwork used as fillers and the face research pictures used as stimuli ( $z = 1.3$ ,  $p = 0.11$ ).

from Leder et al. (2012), which we used in the previous two studies, was valid. Consequently, after standardizing them, we combined the two variables into one expertise measure (hereafter designated “expertise”), which also confirmed that the two samples differed in expertise,  $F_{1,191} = 371.65, p < 0.01$ . Because the distributions barely overlapped, we used sample (low vs. high expertise) as a grouping variable for expertise.

**Main Effects and Moderations** GLMM with content (neutral vs. attractive) as a within-subjects factor and prestige (neutral vs. prestigious) and sample (as a dummy variable reflecting low vs. high expertise) as between-subjects factors indicated an overall effect of expertise ( $F_{1,189} = 27.73, p < 0.01$ ) and of content ( $F_{1,189} = 7.00, p < 0.01$ ), but not prestige ( $F_{1,189} = 1.91, p < 0.28$ ). The overall effect of expertise was due to the fact that experts ( $M = 4.32, SD = 1.07$ ) appreciated the pictures more than laypeople ( $M = 3.50, SD = 1.11$ ). These comparatively positive evaluations by experts provide additional evidence that the purported works of art were credible to experts. The overall effect of content is due to the fact that participants appreciated attractive content ( $M = 4.01, SD = 1.18$ ) more than neutral content ( $M = 3.88, SD = 1.33$ ).

The GLMM further revealed that expertise moderated content,  $F_{1,189} = 42.71, p < 0.01$ , and that expertise also played a marginally significant role in moderating prestige,  $F_{1,189} = 3.24, p = 0.073$ .<sup>5</sup> Table 1 summarizes these results.

Simple contrast tests showed that the moderating effect of expertise on content was not only reflected by the fact that laypeople appreciated portraits of attractive faces ( $M = 3.79, SD = 1.16$ ) more than those of neutral faces ( $M = 3.21, SD = 1.23; F_{1,189} = 38.18, p < 0.01$ )—as predicted, and replicating the Studies 1a and 1b findings—but also by the fact that experts appreciated portraits of attractive faces ( $M = 4.19, SD = 1.16$ ) less than those of neutral faces ( $M = 4.44, SD = 1.14; F_{1,189} = 8.44, p < 0.01$ ). Concerning the moderation of prestige, simple contrast tests indicated, as predicted, that it was caused by the fact that experts appreciated the pictures more when they were purportedly part of the MoMA collection ( $M_{\text{MoMA}} = 4.54, SD = 0.91$  vs.  $M_{\text{control}} = 4.09, SD = 1.17; F_{1,189} = 4.67, p = 0.03$ ), whereas laypeople’s appreciation was not influenced by prestige ( $M_{\text{MoMA}} = 3.44, SD = 1.26$  vs.  $M_{\text{control}} = 3.55, SD = 0.98; F_{1,189} = 0.23, p = 0.63$ ). The findings are displayed in Fig. 3.<sup>6</sup>

**Mediations** Subsequently, within-sample mediation analyses were conducted.<sup>7</sup> To test our prediction that among laypeople, aesthetic pleasure mediated the effect of content

<sup>5</sup> GLMM on the total sample with the continuous expertise variable yielded results that were very similar to the expertise grouping variable. It revealed the predicted significant interactions between expertise and prestige,  $F_{1,189} = 3.90, p = 0.05$ , and between expertise and content,  $F_{1,189} = 34.70, p < 0.01$ . In addition, the analysis indicated a significant main effect of expertise,  $F_{1,189} = 18.34, p < 0.01$  and of content,  $F_{1,189} = 4.062, p = 0.05$ .

<sup>6</sup> Adding gender to the model showed that the content effect was partially moderated by gender ( $F_{1,185} = 14.83, p < 0.01$ ): as simple contrast tests indicated, men appreciated pictures of attractive faces ( $M = 4.16, SD = 1.15$ ) more than those of neutral faces ( $M = 3.78, SD = 1.35; F_{1,185} = 22.31, p < 0.01$ ) because all other contrasts were not significant. This simple effect of men is likely due to the fact that we used pictures of women’s faces. Gender did not moderate the interactions that are of interest to us: expertise and content ( $F_{1,185} = 0.47, p = 0.49$ ) and expertise and prestige ( $F_{1,185} = 0.09, p = 0.76$ ).

<sup>7</sup> Although mediated moderation models may seem at first glance a more suitable approach to analyzing data such as ours, to the best of our knowledge, mediated moderation models that can handle a mixed design (i.e., both within- and between-subject factors) have not yet been developed. Consequently, we resorted to the simple, more traditional mediation analyses.

**Table 1** Summary of the results of Study 2

		Sample		
		Laypersons	Experts	Total <sup>a</sup>
Appreciation <sup>b</sup>	Mean (SD)	3.50 (1.20)	4.32 (1.15)	3.91 (1.18)
	Range	1–6.5	1–7	
Aesthetic pleasure <sup>b</sup>	Mean (SD)	3.43 (1.22)	4.28 (1.12)	3.86 (1.16)
	Range	1–6	1–7	
Admiration <sup>b</sup>	Mean (SD)	3.40 (1.16)	4.11 (1.10)	3.76 (1.13)
	Range	1–7	1–6.5	
Appreciation = Aesthetic pleasure	$\beta$	.49**	0.85**	
Appreciation = Admiration	$\beta$	.73**	0.82**	
Subjective Expertise <sup>c</sup>	Mean (SD)	17.25 (7.06)	33.96 (5.12)	25.61 (6.10)
	Range	6–32	22–42	
Objective Expertise <sup>d</sup>	Mean (SD)	3.66 (1.52)	6.92 (1.81)	5.29 (1.67)
	Range	0–7	1–9	
Correlation Objective & Subjective Expertise	Pearson's <i>r</i>			.71**

<sup>a</sup> corrected for unequal size of expert and layperson samples

<sup>b</sup> scale range: 1–7

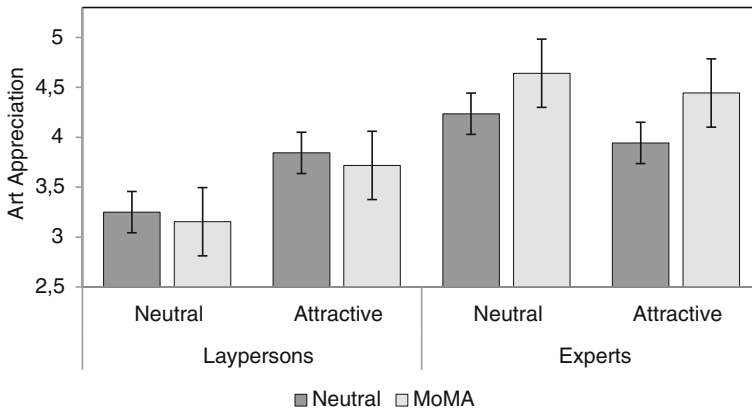
<sup>c</sup> scale range: 6–42

<sup>d</sup> scale range: 0–9

\*\*  $p < 0.01$

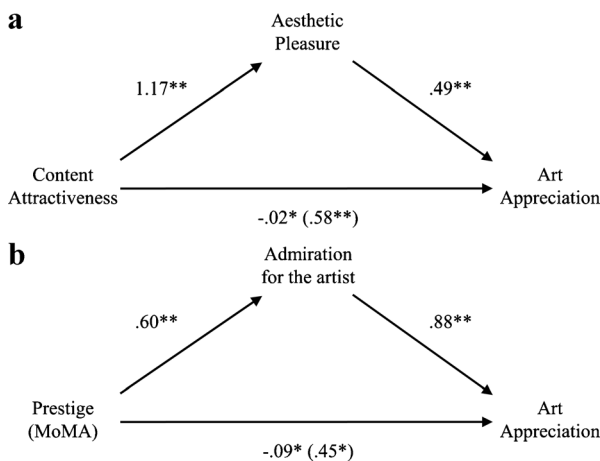
on art appreciation, multiple regression analyses were conducted on the lay sample in order to assess each component of the mediation model (Baron and Kenny 1986). We found that content attractiveness was positively associated with art appreciation ( $\beta = 0.58$ ,  $t_{86} = 6.14$ ,  $p < 0.01$ ), consistent with the above analyses. We also found that content attractiveness was positively related to aesthetic pleasure ( $\beta = 1.17$ ,  $t_{86} = 10.39$ ,  $p < 0.01$ ). Lastly, the results indicated that the mediator, aesthetic pleasure, was positively associated with art appreciation ( $\beta = 0.49$ ,  $t_{86} = 10.36$ ,  $p < 0.01$ ). Because both the **a** and **b** paths were significant, mediation analyses were tested using the Sobel test (Baron and Kenny 1986; MacKinnon et al. 1995; Sobel 1982). The results ( $t = 7.34$ ,  $p < 0.01$ ) support the prediction that aesthetic pleasure mediates the effect of content on art appreciation among laypeople. In addition, the results indicated that the direct effect of content on art appreciation decreased and became virtually zero and nonsignificant ( $\beta = 0.02$ ,  $t_{86} = 0.16$ ,  $p = 0.88$ ) when controlling for aesthetic pleasure, thus also suggesting—virtually full—mediation. Figure 4a displays the results. Furthermore, we refuted the existence of a reverse causal effect between aesthetic pleasure as the mediator and variable appreciation as the outcome by demonstrating that the **b** path of the reversed model differed from the original, i.e., the direct effect of content on aesthetic pleasure did not decrease and remained significant when controlling for art appreciation ( $\beta = 0.84$ ,  $t_{86} = 7.51$ ,  $p < 0.01$ ).

To test our prediction that among experts, the prestige effect on art appreciation is mediated by admiration for the artist, multiple regression analyses were conducted on



**Fig. 3** The effects of neutral vs. attractive depicted content (i.e., faces) and of neutral vs. prestige (i.e., MoMA) on lay and expert art appreciation in Study 2. Laypeople appreciated ostensible artworks exhibiting attractive content more so than did experts who preferred neutral content to attractive content. Contrary to laypeople, experts were positively affected by prestige. The error bars show the standard error of the mean

the expert sample to assess each component of the mediation model (Baron and Kenny 1986). In keeping with the above analyses, it was found that, prestige (as opposed to the control) was positively associated with art appreciation ( $\beta = 0.45, t_{104} = 2.21, p < 0.01$ ). We also found that prestige was positively related to admiration for the artist ( $\beta = 0.60, t_{104} = 3.17, p < 0.01$ ). Our results indicated that the mediator, admiration for the artist, was positively associated with art appreciation ( $\beta = 0.88, t_{105} = 21.97, p < 0.01$ ). Because both the **a** and **b** paths were significant, mediation analyses were tested using the Sobel test (Baron and Kenny 1986; MacKinnon et al. 1995; Sobel 1982). The results ( $t = 3.14, p < 0.01$ ) supported the prediction that admiration for the artist mediated the effect of prestige on art appreciation among experts. In addition, the results indicated that the direct effect of prestige on art appreciation decreased and



**Fig. 4** Study 2: (a) Indirect effect, via aesthetic pleasure, of content on art appreciation among laypeople; (b) Indirect effect, via admiration for the artist, of prestige on art appreciation among experts. \* $p < 0.05$ , \*\*  $p < 0.01$

became close to zero and nonsignificant ( $\beta = -0.09$ ,  $t_{104} = -0.93$ ,  $p = 0.35$ ) when controlling for admiration for the artist, thereby further suggesting—virtually full—mediation. Figure 4b displays the results. Lastly, we refuted the possibility that the mediator, admiration for the artist, might be caused by the outcome variable appreciation (i.e., feedback model or reverse causal effect) by showing that the  $c'$  path of the reversed model differed from the original; in other words, the direct effect of prestige on admiration did not decrease and remained significant when controlling for art appreciation ( $\beta = 0.26$ ,  $t_{104} = 2.85$ ,  $p < 0.01$ ).

As a final check, we verified whether aesthetic pleasure mediated a content effect among experts and whether admiration mediated a prestige effect among laypeople. If our predictions were to prove accurate, then both potential examples of mediated effect needed to be disconfirmed. Although a significant negative association, consistent with the above analyses, between content and appreciation was found relative to the former condition ( $\beta = -0.25$ ,  $t_{105} = 2.97$ ,  $p < 0.01$ ), content was not correlated with aesthetic pleasure among experts as its coefficient was near zero and not significant ( $\beta = 0.12$ ,  $t_{105} = 1.11$ ,  $p = 0.27$ ), thus excluding mediation. With respect to the latter condition, insofar as no total effect of prestige on appreciation was observed among laypeople ( $\beta = -0.11$ ,  $t_{85} = -0.48$ ,  $p = 0.63$ ), mediation was also excluded.

## Discussion

Two major mechanisms thought to be at work in aesthetic evolution have been adduced in the literature, and these have also been applied to art. The EA mechanism assumes that art has evolved (undergone change over time), to match aesthetic preferences that were naturally selected in other contexts (Pinker 2002; Verpooten and Nelissen 2010), whereas the CA mechanism assumes instead that art preferences coevolve with artworks (Prum 2013). Prestige bias (preferentially copying influential individuals) is expected to be an important driver of this CA process (Boyd and Richerson 1985). Based on empirical and theoretical work in signaling theory and animal communication, we predicted that expertise would moderate these mechanisms: laypeople appreciate art based on the extent to which its content corresponds with naturally selected aesthetic preferences, whereas art experts appreciate art indirectly via the prestige specific to the context associated with art, and in so doing deviate from naturally selected aesthetic preferences. In two studies we confirmed these predictions. We proceed with a more detailed discussion of our main findings, relate them to cultural evolution theory, discuss limitations, and suggest further research into other, including non-art-related, cultural domains as well as into the potential functions of expert appreciation that deviates from lay appreciation and naturally selected aesthetic preferences.

## Main Findings

Study 1 demonstrated that in the controlled setting of the laboratory, laypeople appreciate artworks depicting attractive faces more than neutral faces. Study 2 replicated this in an online setting. In addition, both Studies 1b and 2 showed that this pattern of art



appreciation occurred as a result of the fact that laypeople find attractive faces to be more aesthetically pleasing than neutral faces. On the other hand, prestige, as afforded by the alleged context of the MoMA, does not affect lay appreciation. These findings support the contention that lay appreciation corresponds to naturally selected aesthetic preferences, given that perceiving facial beauty most likely evolved to be rewarding in order to motivate adaptive social partner and mate choice (Little et al. 2011). As such, these findings are consistent with the EA mechanism and corroborate previous findings that were obtained using general, cross-cultural audiences (Dissanayake 1998; Komar et al. 1997; Voland and Grammer 2003).

In Study 2, real art experts (artists and other art professionals) participated in addition to laypeople. The results indicated that, in contrast to lay appreciation, expert appreciation was positively affected by prestige. In line with the prestige bias mechanism, this prestige effect was mediated by admiration for the artist, rather than by aesthetic pleasure (Henrich and Gil-White 2001). Moreover, Study 2 showed that experts appreciate portraits of attractive faces to a lesser degree than portraits of neutral faces. Thus, we found that prestige-biased expert appreciation not only deviates from an evolved aesthetic preference for facial beauty, which is already consistent with CA, but even runs counter to it.

Hence, across two studies we found support for our hypothesis that expertise moderates the two major mechanisms of aesthetic evolution in the art domain. The finding that experts appreciate art based on the prestige of its context in association with a deviation from naturally selected aesthetic preferences supports our contention that a prestige-bias-driven CA mechanism is characteristic of a specialized cultural domain, viz., the artworld, and may be responsible for modern art's deviation from naturally selected aesthetic preferences. This might indicate that experts socially learn and culturally maintain these deviating art preferences through the use of prestige bias in the artworld. Even though our findings do not allow us to draw any final conclusions on the matter, the present research does suggest directions for further research that we will discuss in addition to some of the present work's limitations. But first we will deal with how our research relates to cultural evolution theory.

### **Relation to Cultural Evolution Theory**

Our finding that experts are influenced by the context provided by the prestigious MoMA, while laypeople are not, is consistent with the claims of contextual aestheticians who see a clear link between expertise and a sensitivity for relevant art-historical contexts (Bullot and Reber 2013; Danto 2003). However, we should note that our findings seem to contradict the common assumption among cultural evolutionists according to which *naive* individuals above all others—and therefore laypeople—should employ prestige bias (Atkisson et al. 2012; Henrich and Gil-White 2001). Given that our data are representative of actual expert art appreciation—at any rate, they are in line with contextual aesthetics—we may speculate about its cause. The reason cultural evolutionists predict that naive individuals in particular should employ prestige bias stems from the logical assumption that it is an effective strategy to efficiently acquire “better-than-average” information from successful experts in a domain (Henrich and Gil-White 2001). For example, field research has shown that individuals from a small-scale society were biased to learn from those who were

perceived as being more prestigious, both within and across three cultural domains (fishing, growing yams, and using medicinal plants; Henrich and Broesch 2011; but see Reyes-Garcia et al. 2008). However, our data differ in two respects: they were obtained from members of a large-scale, Western society and they concern prestige in a cultural domain (the artworld) that, in contrast with the subsistence domains studied by cultural evolutionists, does not seem to have any direct utilitarian functions. Given the lack of direct utility, it may well be that the bulk of laypeople have little to gain from painstakingly overruling the EA mechanism by employing the artworld-specific prestige bias. This is in line with a recent study that also concerns members of a large-scale society, which found that individuals choose not to employ prestige bias if they think it will not pay off (Martens and Tracy 2013). We do not mean to suggest that laypeople do not employ the prestige bias at all relative to art appreciation. The general audience may well be influenced by the artistic tastes of influential celebrities such as soccer players (Basil 1996). However, these prestigious individuals are usually not art experts and thus, on average, we do not expect their preferences to divert from the naturally selected aesthetic preferences of the general audience. Thus, even if “lay prestige” exists, one such bias may not add much to explaining lay art preferences (cf. Claidière and Sperber 2007), which is why we did not include it in our studies. In other words, our findings suggest that lay preferences do not undergo prestige-driven coevolution with modern artworks and theories because they are outsiders, rather than naive social learners engaging with the artworld and modern art. Also one might expect that experts do not need to employ prestige bias because they may be able to rely on their own expert knowledge. However, when quality (i.e., good art) is difficult to assess and, moreover, is determined by ongoing coevolution between artworks and evaluations, it makes sense that experts continue to use prestige bias. Our stimulus check, which indicated that experts and laypeople are equally poor at distinguishing between real artwork belonging to the MoMA and face research pictures, also tentatively points in that direction. Since anything put in an art context can be regarded as modern art (from urinals to replicas of Brillo boxes: Danto 2003), “good” art—and the theory behind it—is by itself often very difficult to recognize, and even experts may sometimes need to rely on context signals such as prestige in order to make informed judgments. This may be associated with cultural runaway processes similar to those that may cause financial market bubbles or exaggerated male display traits such as the peacock’s tail. In contrast, lay appreciation and corresponding popular, folk, or traditional art may be kept largely in check by the pull of naturally selected aesthetic preferences.

### Limitations and Further Research

In this research we used photographs of faces that varied in ratings of beauty to verify the expertise-dependent effect of variable biological relevance on preferences. We assumed that our findings for these face portraits apply more generally. In order to establish whether this is the case, however, further research might include other stimuli, such as landscapes, (parts of) human figures, animals, nonrepresentational images, and so on, and might vary them in relation to biological relevance as well. To further assess the generalizability of expertise as a moderator of the two preference mechanisms in cultural domains, one might try to verify whether expertise also acts as a moderator in other art forms that have a specialized counterpart within the artworld, such as music,

dance, and theater. One might even test whether or not expertise moderates preferences with respect to the output of nonartistic domains, such as science and technology. Findings may be relevant for the ongoing debate about the respective roles of content and context biases (such as prestige) in cultural evolution (Claidière and Sperber 2007; Henrich and Boyd 2002; Henrich and McElreath 2003; Morin 2013).

Given that a universally human, naturally and/or sexually selected preference for facial beauty is well-documented (Little et al. 2011), it is fairly safe to conclude that our findings indicate that among experts this preference is trumped with respect to art appreciation. The finding that this is associated with a prestige effect mediated by admiration suggests that prestige bias plays a role in this. In cultural evolution theory, naturally selected preferences are sometimes referred to as cognitive attractors in order to indicate that cultural representations tend to gravitate toward them (Morin 2013; Sperber and Hirschfeld 2004). We could speculate that prestige bias enables experts (including artists) to counter the pull of attraction and deliver an “uphill battle” against the mere exploitation of evolved aesthetic preferences (Verpooten and Nelissen 2012). However, our data cannot exclude the possibility that the association between prestige and neutral face preference has other causes. To verify this, a study mimicking cultural evolutionary processes in the laboratory might be employed (Mesoudi 2007). Furthermore, our data do not allow us to make any definitive conclusions about *why* experts employ prestige bias and deviate from laypeople to the extent that they prefer artworks depicting neutral faces to attractive ones. They could be avoiding the costs of exploitation or reaping the benefits of prestige and/or the neutral preference. We consider three non-mutually exclusive hypotheses that could be tested within the framework of our account.

Our first functional explanation, the *cognitive challenge hypothesis* (cf. Cupchik and Laszlo 1992), claims that experts prefer neutral over attractive content because they find the former more thought-provoking, meaningful, and intellectually challenging than the latter. This hypothesis conceives enjoying art as a kind of cognitive puzzle that experts attempt to solve in a pleasurable way (Van de Cruys and Wagemans 2011). Experts therefore accept cognitive challenges and ambiguities more so than do laypeople. This leads to the prediction that experts enjoy neutral content more than attractive content because neutral content provides for a greater puzzle. However, this account does not deal with the fact that experts use prestige bias.

Our second explanation is labeled the *resistance hypothesis*. It has been suggested that art is a pleasure technology that succeeds by exploiting individuals’ naturally selected aesthetic preferences (Pinker 1997, 2002). As such, spectators may trade rewards from indulging in attractive content with engaging in biological activities, resulting in less effort being allocated to reproduction (Enquist et al. 2002). As a consequence, experts might learn by employing the prestige bias in an effort to resist exploitation, and they might selectively prefer content that moves away from naturally selected aesthetic preferences, much in the same way consumers learn to resist tempting food (Geyskens et al. 2008).

Our third hypothesis, the *identification hypothesis*, holds that expressing appreciation for neutral content could be understood as a sign of identification with a group (Cornelissen et al. 2007). In this view, neutral art appreciation distinguishes experts from laypeople, thereby conferring higher status on experts (Bourdieu 1979). The

higher status (prestige) is what fuels the cultural evolution in the given domain (Boyd and Richerson 1985).

## Conclusion

We found support for our contention that expertise moderates the two major mechanisms of aesthetic evolution in relation to art: whereas lay appreciation corresponds to naturally selected aesthetic preferences, expert appreciation, driven by a prestige bias, coevolves with artworks and therefore deviates from laypeople's preferences. Hence, the present research has provided initial support for our evolutionary account of expert appreciation and modern art's corresponding deviation from naturally selected aesthetic preferences. Based on this account, we have suggested functions for this deviation in the art domain that can be subjected to further empirical investigation and comparative evaluation. More generally, we have suggested that expertise may act as a moderator of the major mechanisms of (aesthetic) preference evolution in other cultural domains as well.

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## Appendix

The multiple choice art quiz consisted of ten questions. One question was the above-mentioned check concerning whether the fact that the face stimuli did not belong to the MoMA was successfully concealed; this question did not count for the expertise score. In seven of the remaining nine questions, we asked who created the visual artwork that was displayed, ranging from Renaissance art (Bruegel's *The Tower of Babel*) to contemporary art (e.g., Damien Hirst's *The Physical Impossibility of Death in the Mind of Someone Living*) and variously involving a painting, an installation, or a performance. One question concerned who painted the *Mona Lisa* and another involved placing art genres in chronological order. With the exception of the latter, all questions were multiple choice, offering 4 or 5 options, including an "I don't know" option.

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